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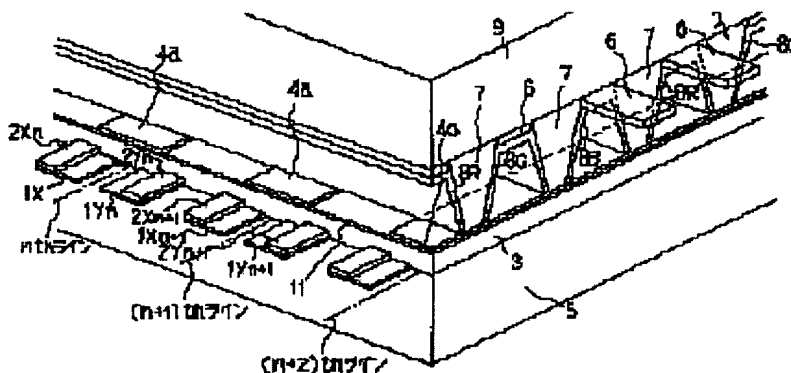
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Years: 1971-2002

Text: Patent/Publication No.: JP09102280

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**Abstract:** PROBLEM TO BE SOLVED: To reduce the effective area of discharge by replacing a part of a cathode film with a discharge inert film, and to improve contrast by reducing the maintenance discharge currents per pulse and increasing the maintenance discharge currents.

**SOLUTION:** An MgO pattern 4a, which functions as a discharge cathode, is made on a discharge

inert film 11. Therefore, the discharge inert film 11 fronts on the discharge space only at the gap section between the MgO patterns 4a, and the MgO pattern 4a is made on the gap inside each pair of maintenance discharge electrodes across a dielectric layer 3 and a discharge inert film 11. Here, in the region where discharge inert material is arranged on the surface, this does not cause discharge easily even by voltage application, and the MgO pattern 4 causes discharge with relatively lower voltage. This way, the maintenance discharge current per pulse is reduced and the maintenance discharge pulses are increased by reducing the effective area of the discharge, whereby contrast is improved, and wrong discharge between adjacent line is prevented.

**Int'l Class:** H01J01102; H01J01100

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to power-saving-izing and the enhancement in contrast in a field electric discharge type AC type plasma display panel, and the incorrect electric discharge suppression between contiguity cells.

[0002]

[Description of the Prior Art] Drawing 5 is telecommunication society technical report EID-92-86 and partial structural drawing of the conventional field electric discharge type plasma display panel shown in pp.7-12 (1993. 1). The bus electrode of the couple for the maintenance discharge electrode of the couple (X-Y) which 1x and 1y become from a transparent electric conduction layer, and 2x and 2y supplying a voltage to the maintenance discharge electrodes 1x and 1y, respectively, the uniform dielectric layer in which 3 covers a bus electrode, uniform MgO vacuum evaporatio layer on which 4 functions as a cathode of electric discharge, and 5 are front-windshield substrates in which the above 1, 2, 3, and 4 is carried among drawing. Moreover, for 6, the address electrode which carries out a right-angled transposition with the maintenance discharge electrode 1, and 7 are the barrier rib (it is hereafter called a septum) which divides each address electrode 6, 8R, 8G, and 8B. The red and green which were formed in the wall surface of the address electrode 6 and the septum 7, respectively, a blue fluorescent substance, and 9 are tooth-back glass substrates which carry the above 6, 7, and 8. By the crowning of a septum 7 touching MgO vacuum evaporatio layer 4, the electric discharge space surrounded by the fluorescent substance and the oxidization \*\*\*\*\* (hereafter referred to as MgO) vacuum evaporatio layer 4 which were formed in the wall surface of the above-mentioned address electrode 6 and the septum 7 is formed, and this electric discharge space is filled with the mixed gas of Ne+Xe.

[0003] The drive sequence of the above field electric discharge type plasma display is the outline following.

\*\* Carry out line sequential scanning of the maintenance discharge-electrode 1y by the side of line sequential write-in electric discharge:Y, cause one AC electric discharge between maintenance discharge-electrode 1y and the address electrode 6 with outputting the signal according to image data to the address electrode 6 synchronizing with it, and store up a wall charge on MgO front face near the Y electrode 1y of the cell made to emit light by the next drive sequence \*\*.

\*\* Only the number of pulses makes the maintenance electric discharge between X-Y cause in the cell written in by drive sequence \*\* by impressing AC pulse for maintenance electric discharge once or more between maintenance discharge-electrode 1x and 1y on the whole X-Y maintenance electric discharge:panel surface.

\*\* Impress sufficient bias not to be concerned with the existence of a complete write-in electric discharge:wall charge, but cause the electric discharge between X-Y between maintenance discharge-electrode 1x and 1y all over a panel.

\*\* If a deletion pulse is impressed between maintenance discharge-electrode 1x and 1y all over a complete deletion electric discharge:panel, a wall charge unnecessary to drive sequence \*\* of a degree will be eliminated. Each fluorescent substance 8R, 8G, and 8B If the ultraviolet radiation emitted in an electric discharge process is received, each firefly light color red, green, and blue will be emitted. In this way, a desired color picture is obtained.

[0004]

[Problem(s) to be Solved by the Invention] Now, the contrast improvement on a display is explained as first technical problem. The conventional field electric discharge type plasma display panel is constituted as mentioned above, and although only the electric discharge cell (it is hereafter called a cell suitably) chosen in writing in drive sequence \*\*\*\* emits light, in drive sequence \*\*\*\*, all cells emit light unconditionally. Therefore, it has some photogenesis intensities by electric discharge of drive sequence \*\*\*\* also in the cell of OFF which is not chosen, and has become the cause to which this worsens contrast on a display. First, since contrast is the ratio of a white level and black level, it is examined about lowering black level as a contrast remedy, or raising a white level.

[0005] It can consider making small the discharge current of the complete writing / complete deletion of drive sequence \*\*\*\* as a remedy of contrast, as compared with the maintenance discharge current of drive sequence \*\*, in order to lower black level. However, any [ of drive sequence \*\*\*\*\* ] electric discharge is mainly performed among X-Y, and since, as for the voltage impressed among the maintenance discharge electrodes 1x and 1y, the drive sequence \*\* becomes large inevitably rather than drive sequence \*\*, this remedy can be theoretically said are difficult. Next, as other contrast remedies, in order to raise a white level, it can consider increasing the pulse number of maintenance electric discharge of drive sequence \*\*. However, only by increasing a pulse number, the new problem that the power consumption of maintenance electric discharge increases proportionally occurs, and the evil in which the temperature of a plasma display panel rises also comes out. Then, it is necessary to decrease the cell current which flows in case of one maintenance electric discharge in inverse proportion to a pulse number. Although it is the most effective cell current decreasing method under the panel structure shown in the conventional drawing 5 forming beforehand the electrode width of face of the maintenance discharge electrodes 1x and 1y thinly, and reducing the area of maintenance electric discharge At this time, if thinning of the electrode width of face of the bus electrodes 2x and 2y is not carried out simultaneously, the proportion of the fraction of the shadow of the bus electrodes 2x and 2y to photogenesis area will increase, and the brightness on a check by looking will fall for those who look at a plasma display. However, since the electrode width of face of the above-mentioned bus electrodes 2x and 2y should be originally set up thinly to the level which does not have trouble in the pattern formation yield of this electrode in order to stop the proportion of the fraction of the above-mentioned shadow, there is little room of thinning. According to the above study, power consumption of maintenance electric discharge is not increased, but there is distress in taking a contrast remedy under the panel structure shown in the conventional drawing 5.

[0006] Next, the incorrect electric discharge suppression between contiguity cells is explained as second technical problem. The conventional field electric discharge type plasma display panel is constituted as mentioned above, the partition between contiguity cells only has a septum 7, and there is no septum into which it divides physically between the n-th maintenance discharge-electrode pair and the maintenance discharge-electrode pair of eye \*\* (n+1) watch. Therefore, there is risk of causing incorrect electric discharge about the gap between contiguity maintenance discharge-electrode pairs (for example, between 1yn and 1xn+1). It can attain by enlarging the gap between maintenance discharge-electrode pairs which the above adjoins enough about this incorrect electric discharge suppression compared with the internal gap (for example, between 1xn and 1yns) of a maintenance discharge-electrode pair. That is, since it is easy to be influenced of the electric field by the address electrode 6 so that the pass of electric discharge is long, the property to be hard to generate electric discharge is used.

[0007] Here, an example about each dimension is described below supposing the display panel of the 480x640 pixel number of about 21 inches of vertical angles.

Contiguity maintenance discharge-electrode pair pitch : 0.675mm Gap:0.22mm address electrode 6 between contiguity maintenance discharge-electrode pairs pitch : Interior gap of 0.225mm maintenance discharge-electrode pair : 0.075mm bus electrode 2x, 2y piece : When making a contiguity maintenance discharge-electrode pair pitch reduce for depth (between MgO layer 4 and fluorescent substance 8 pars basilaris ossis occipitalis):0.1mm of 0.075mm electric discharge space, however highly-minute-izing of a plasma display panel, there is a limitation in taking the large gap between contiguity maintenance discharge-electrode pairs. Although making thin instead width of

face of maintenance discharge-electrode pair 1x and 1y is also considered, since the problem of a photogenesis brightness fall accompanies it, too much thinning is not suitable. If it follows, for example, a contiguity maintenance discharge-electrode pair pitch is set to no less than 0.3mm, the impossible dimension distribution which is not as follows on pattern formation.

interior gap of a Maintenance Discharge-electrode (x [ 1 ], 1y) Width-of-face:0.075-0.1mm  
 maintenance discharge-electrode pair : 0.05mm bus electrode (x [ 2 ], 2y) width of face : gap  
 between 0.05mm contiguity maintenance discharge-electrode pairs: -- here, 0.05-0.1mm, the gap  
 between contiguity maintenance discharge-electrode pairs will be set to 0.1mm or less, and the  
 incorrect electric discharge between above-mentioned contiguity lines will generate it frequently  
 under this condition Therefore, there is a limitation also in advancing highly minute-ization only by  
 adjusting a dimension under the panel structure of the conventional drawing 5 .

[0008] It aims at obtaining the field electric discharge type AC type plasma display in which a contrast improvement is possible, suppressing [ were made in order that this invention might cancel an above-mentioned technical problem, and ] the increase in the power consumption of maintenance electric discharge.

[0009] Furthermore, even if it narrows the gap between contiguity maintenance discharge-electrode pairs, the incorrect electric discharge between contiguity lines does not occur, but it aims at obtaining the field electric discharge type AC type plasma display in which dealing with highly-minute-izing is possible.

[0010]

[Means for Solving the Problem] In order to attain the above purpose, the field electric discharge type AC type plasma display of invention concerning a claim 1 Two or more pairs of electric discharge maintenance electrode pairs by which contiguity arrangement is carried out in parallel on the internal surface of parietal bone of one front-windshield substrate of the glass substrate of a couple, The dielectric layer which covers the above-mentioned electrode pair, and the cathode layer formed in the above-mentioned dielectric layer top, The septum which divides electric discharge space in the above-mentioned electrode pair and the rectangular orientation on the internal surface of parietal bone of the tooth-back glass substrate of another side, In the field electric discharge type AC type plasma display panel which has an address electrode for being arranged between each above-mentioned septum and making a unit photogenesis field emit light alternatively, respectively It is characterized by replacing a part of cathode layer formed in the above-mentioned dielectric layer top exposed to the above-mentioned electric discharge space by the insulator layer which consists of an electric discharge inactive material.

[0011] Moreover, the field electric discharge type AC type plasma display of invention concerning a claim 2 Two or more pairs of electric discharge maintenance electrode pairs by which contiguity arrangement is carried out in parallel on the internal surface of parietal bone of one front-windshield substrate of the glass substrate of a couple, The dielectric layer which covers the above-mentioned electrode pair, and the insulator layer which consists the above-mentioned dielectric layer top of a wrap electric discharge inactive material uniformly, The cathode layer pattern formed in the above-mentioned insulator layer top, and the septum which divides electric discharge space in the above-mentioned electrode pair and the rectangular orientation on the internal surface of parietal bone of the tooth-back glass substrate of another side, The address electrode for being arranged between each above-mentioned septum and making a unit photogenesis field emit light alternatively, respectively, It is the field electric discharge type AC type plasma display panel which has the fluorescent substance of the predetermined luminescent color in the above-mentioned electric discharge space internal surface. It is characterized by forming a cathode layer pattern and limiting an electric discharge field on the insulator layer which consists of an electric discharge inactive material formed in the above-mentioned dielectric layer top exposed to the above-mentioned electric discharge space.

[0012] Moreover, the field electric discharge type AC type plasma display of invention concerning a claim 3 Two or more pairs of electric discharge maintenance electrode pairs by which contiguity arrangement is carried out in parallel on the internal surface of parietal bone of one front-windshield substrate of the glass substrate of a couple, Uniformly the dielectric layer which covers the above-mentioned electrode pair, and the above-mentioned dielectric layer top A wrap cathode layer, The

insulator layer pattern which consists of an electric discharge inactive material formed in the above-mentioned cathode layer top, The septum which divides electric discharge space in the above-mentioned electrode pair and the rectangular orientation on the internal surface of parietal bone of the tooth-back glass substrate of another side, The address electrode for being arranged between each above-mentioned septum and making a unit photogenesis field emit light alternatively, respectively, It is the field electric discharge type AC type plasma display panel which has the fluorescent substance of the predetermined luminescent color in the above-mentioned electric discharge space internal surface. It is characterized by being formed in the above-mentioned dielectric layer top exposed to the above-mentioned electric discharge space, forming the insulator layer pattern which consists \*\* of an electric discharge inactive material on a cathode layer, and limiting an electric discharge field.

[0013] Moreover, the field electric discharge type AC type plasma display of invention concerning a claim 4 is characterized by the cathode layer pattern of field electric discharge type AC type plasma display \*\*\*\*\* according to claim 2 being a cathode layer pattern formed by the lift-off method.

[0014] Moreover, it is characterized by the insulator layer pattern with which the field electric discharge type AC type plasma display of invention concerning a claim 5 consists of an electric discharge inactive material of field electric discharge type AC type plasma display \*\*\*\*\* according to claim 3 being an insulator layer pattern which consists of an electric discharge inactive material formed by the lift-off method.

[0015] Moreover, the cathode layer pattern formed in the insulator layer top where the field electric discharge type AC type plasma display of invention concerning a claim 6 consists of an electric discharge inactive material on the top of a dielectric layer of a field electric discharge type AC type plasma display panel according to claim 2 is characterized by being the cathode layer pattern formed in the orientation of a maintenance discharge-electrode pair band-like at the upper part section of each interior gap of a maintenance discharge-electrode pair.

[0016] Moreover, the field electric discharge type AC type plasma display of invention concerning a claim 7 The cathode layer pattern formed in the insulator layer top which consists of an electric discharge inactive material on the top of a dielectric layer of a field electric discharge type AC type plasma display panel according to claim 2 It is characterized by being the cathode layer pattern formed in the insulator layer top which consists of an electric discharge inactive material between the septa which divide electric discharge space in the shape of a cell at the upper part section of the cathode layer pattern formed in band-like, or each interior gap of a maintenance discharge-electrode pair.

[0017] Moreover, the insulator layer pattern which consists of an electric discharge inactive material by which the field electric discharge type AC type plasma display of invention concerning a claim 8 is formed in the cathode layer top on the top of a dielectric layer of a field electric discharge type AC type plasma display panel according to claim 3 is characterized by being the insulator layer pattern formed in the orientation of a maintenance discharge-electrode pair band-like at the upper part section of each gap between contiguity maintenance discharge-electrode pairs.

[0018] moreover, the material which constitutes the insulator layer which the material from which the field electric discharge type AC type plasma display of invention concerning a claim 9 constitutes the cathode layer of the claims 1 and 2 or a field electric discharge type AC type plasma display panel given in three becomes from MgO and an electric discharge inactive material -- aluminum<sub>2</sub> O<sub>3</sub> or TiO<sub>2</sub> it is -- it is characterized by things

[0019]

[Embodiments of the Invention]

Gestalt 1. view 1 of operation is partial structural drawing of the field electric discharge type AC type plasma display panel which shows the gestalt 1 of operation of this invention. 11 are a wrap electric discharge inactive layer uniformly among drawing about the dielectric layer top which consists of a high material of a work function from MgO which constitutes a cathode layer, and 4a is a MgO pattern which functions as a cathode of the electric discharge formed in the top of the above-mentioned electric discharge inactive layer 11 using the lift-off method etc. Other configurations presuppose that it is the same as that of the configuration shown in the conventional drawing 5 . It is

necessary to fill the following demands other than having a work function higher than MgO as a material of the electric discharge inactive layer 11 here.

(1) It is hard to wear a chemically stable thing, and having the coefficient of thermal expansion near MgO and (3) (4) sputtering by the heat history (450 degree-C level) of that it is an insulating material and an after [ (2) ] process (since the plasma space of electric discharge is approached), These demands are taken into consideration and they are SiO<sub>2</sub>, aluminum<sub>2</sub> O<sub>3</sub>, and TiO<sub>2</sub>. Three sorts of materials were chosen as a candidate. And the bottom of the panel structure of the conventional drawing 5 was substituted for three sorts of above-mentioned materials to MgO vacuum evaporatio layer 4, and the function as an electric discharge inactive layer was checked on practical use level. The various dimensions of the electric discharge cell of a test sample are described below.

Contiguity maintenance discharge-electrode pair pitch : Gap:0.22mm address between 0.675mm contiguity maintenance discharge-electrode pairs 6 electrode pitch : Interior gap of 0.225mm maintenance discharge-electrode pair : 0.075mm bus electrode (x [ 2 ], 2y) width of face : Each depth (distance with various electric discharge inactive layers and fluorescent substance 8 pars basilaris ossis occipitalis):0.1mm electric discharge inactive layer of 0.075mm electric discharge space was formed by the vacuum deposition method. The test result of an electric discharge inactive layer is shown below including the reference data of MgO.

[0020]

[Table 1]

放電 不活 性膜	各種物性値			実験結果(放電電圧)	
	線膨張係数	スパッタリング収率(10keV Kr <sup>+</sup> )	仕事関数	開始電圧	維持電圧
(MgO)	130 X 10 <sup>-7</sup> /deg	1.8 total atoms/ion	3.1~4.4	224~250V	140~148V
Al <sub>2</sub> O <sub>3</sub>	80 X 10 <sup>-7</sup> /deg	1.5 total atoms/ion	4.7eV	334~467V	275~428V
TiO <sub>2</sub>	90 X 10 <sup>-7</sup> /deg	1.6 total atoms/ion	6.21eV	373~422V	270~380V
SiO <sub>2</sub>	5 X 10 <sup>-7</sup> /deg	3.6 total atoms/ion	5.00eV	—	—

[0021] In addition, it is SiO<sub>2</sub> as a result of a preliminary test. Since an electric discharge inactive layer had the bad adhesion with MgO layer, it was excepted from the candidate candidate of a test. As shown in Table 1, it is aluminum<sub>2</sub> O<sub>3</sub>. TiO<sub>2</sub> Since the voltage even with higher than the breakdown voltage of MgO even maintaining electric discharge was needed, it turns out that it may fully function as an electric discharge inactive layer. In this way, in the electric discharge inactive layer 11 of the drawing 1 showing the gestalt 1 of operation of this invention, it is aluminum<sub>2</sub> O<sub>3</sub>. Are, and it is and is TiO<sub>2</sub>. It decided to apply a vacuum evaporatio layer. Although electric discharge inactive layer 11 [ itself ] is a solid vacuum evaporatio layer, since MgO pattern 4a which functions as a cathode of electric discharge is formed on it, the electric discharge inactive layer 11 is exposed to electric discharge space only in the gap fraction between MgO pattern 4a. Here, MgO pattern 4a separates the dielectric layer 3 and the electric discharge inactive layer 11, and is formed in the upper part section of each interior gap of a maintenance discharge-electrode pair. Moreover, pattern width of face of MgO pattern 4a is set to 0.3mm, and has set other dimensions as the above-mentioned test sample and above-mentioned identity of an electric discharge inactive layer.

[0022] Even if it is exposed to electric discharge space, in the field in which the electric discharge inactive material has been arranged, electric discharge is not easily caused by voltage impression on a front face. On the other hand, in the field which has MgO in a front face, electric discharge can be relatively caused on a low voltage. Therefore, it becomes possible to make MgO discharge only only

within the field which it has in a front face by making applied voltage into a predetermined value. A contrast improvement is attained, decreasing the effective area of electric discharge, decreasing the maintenance discharge current per one pulse, increasing a maintenance electric discharge pulse number, and suppressing the increase in the power consumption of maintenance electric discharge by replacing a part of cathode front face exposed to electric discharge space by the electric discharge inactive layer, without changing the dimension of the maintenance discharge electrodes 1x and 1y or the bus electrodes 2x and 2y. According to the test result, reducing the maintenance discharge current in the gestalt 1 of this operation about 10% as compared with it of the conventional example was checked.

[0023] Gestalt 2. view 2 of operation is partial structural drawing of the field electric discharge type AC type plasma display panel which shows the gestalt 2 of operation of this invention. Here, as a cathode of electric discharge, functioning MgO pattern 4b is what was formed in the top of the electric discharge inactive layer 11 in the electric discharge space between septa 7 band-like, and other configurations are the same as that of drawing 1. Width of face of MgO pattern 4b was set to 0.1mm among drawing. Although MgO surface field which mainly participates in electric discharge by the physical septum by the septum 7 was decided with the panel structure shown in the conventional drawing 5, it still had the width of face of 0.15-0.2mm. Since it narrows to an electric discharge field with a pattern width of face [ of MgO ] of 0.1mm according to the structure of the gestalt 2 of this operation, the maintenance discharge current can be reduced. The operation whose contrast improvement is attained is the same as that of an explanation with the gestalt 1 of operation, suppressing the increase in the power consumption of maintenance electric discharge. As for the maintenance discharge current in the gestalt 2 of this operation, according to the test result, about 35% of the reduction was checked as compared with it of the conventional example.

[0024] Gestalt 3. view 3 of operation is partial structural drawing of the field electric discharge type AC type plasma display panel which shows the gestalt 3 of operation of this invention. Here, as a cathode of electric discharge, functioning MgO pattern 4c is what was arranged in the shape of a cell among the upper part section of each interior gap of a maintenance discharge-electrode pair of the top of the electric discharge inactive layer 11 in the electric discharge space between septa 7, and other configurations are the same as that of drawing 1. The operation whose contrast improvement is attained is the same as that of an explanation with the gestalt 1 of operation, suppressing the increase in the power consumption of maintenance electric discharge. According to the test result, the maintenance discharge current when designing a cell size to 0.3mmx0.09mm was mostly reduced by half as compared with the conventional example. As mentioned above, according to the structure of the gestalt 3 of this operation, the maintenance discharge current can be decreased free by the pattern design of MgO.

[0025] Gestalt 4. view 4 of operation is partial structural drawing of the field electric discharge type AC type plasma display panel which shows the gestalt 4 of operation of this invention. Although the front face of the dielectric layer 3 is uniformly worn by the electric discharge inactive layer 11 and the specific MgO patterns 4a, 4b, and 4c are formed in the top with the gestalt 1, 2, and 3 of previous operation, respectively This lamination can be changed, the front face of the dielectric layer 3 can be uniformly worn by MgO vacuum evaporation layer 4, and the maintenance discharge current can be decreased free by the electric discharge inactive layer pattern design also as a configuration which forms an electric discharge inactive layer pattern in the top. Insulator layer pattern 11a which consists of a band-like electric discharge inactive material is what was formed in the orientation of a maintenance discharge-electrode pair at the upper part section of each gap between contiguity maintenance discharge-electrode pairs of the top of the cathode layer 4 formed in the top of the dielectric layer 3 among drawing, and the above-mentioned insulator layer pattern 11a is formed by the lift-off method here. With the gestalt 1, 2, and 3 of operation, although the MgO patterns 4a, 4b, and 4c were formed by the lift-off method, respectively, the vacuum evaporation of the MgO will be carried out from on a resist pattern in that case. Therefore, in order to make resist sublation of a back process easy, substrate heating at the time of MgO vacuum evaporation is not appropriate. However, it is considered important to use MgO as <111> orientation layer from the viewpoint of a cathode life, and, for that, it is appropriate to give substrate heating at the time of MgO vacuum evaporation. The operation whose contrast improvement is attained is the same as that of an



explanation with the gestalt 1 of operation, suppressing the increase in the power consumption of maintenance electric discharge. Since according to the gestalt 4 of this operation the above-mentioned resist pattern is not yet formed at the time of MgO vacuum evaporation and substrate heating is not restrained, there is the characteristic feature which can obtain good <111> orientation layer.

[0026] The gestalt 5 of gestalt 5. book implementation of operation sets up as follows the dimension of the following in the drawing 1 showing the gestalt 1 of previous operation.

Contiguity maintenance discharge-electrode pair pitch : 0.3mm Gap:0.05mm address electrode 6 between contiguity maintenance discharge-electrode pairs pitch : Interior gap of 0.1mm maintenance discharge-electrode pair : 0.05mm bus electrode (x [ 2 ], 2y) width of face : Width of face of depth (between various electric discharge inactive layers and fluorescent substance 8 pars basilaris ossis occipitalis):0.1mmMgO pattern 4a of 0.05mm electric discharge space : In the set point of 0.15mm above, the gap between contiguity maintenance discharge-electrode pairs and the interior gap of a maintenance discharge-electrode pair serve as the same value. In partial structural drawing of the conventional panel temporarily shown in drawing 5 , if an electrode dimension is set up similarly, the incorrect electric discharge probability of occurrence of the adjoining gap between maintenance discharge-electrode pairs (for example, between 1yn and 1xn+1) will be set to the probability of occurrence and this level of maintenance electric discharge of the interior gap (for example, between 1xn and 1yns) of a maintenance discharge-electrode pair. However, according to the gestalt 5 of this operation, since the electric discharge inactive material 11 is arranged by the width of face of 0.15mm between contiguity lines, the pass length of incorrect electric discharge is also set to 0.15mm, and it becomes one 3 times the value of this compared with 0.05mm of the pass length of regular maintenance electric discharge, and it is enabled to lose occurrence of incorrect electric discharge, and dealing with highly-minute-izing is attained.

[0027]

[Effect of the Invention] As mentioned above, by replacing a part of cathode layer which functions as a cathode of the electric discharge exposed to electric discharge space by the electric discharge inactive layer according to invention according to claim 1 While decrease the effective area of electric discharge, the maintenance discharge current per one pulse is decreased, a maintenance electric discharge pulse number is increased, and the contrast improvement is possible, suppressing the power consumption of maintenance electric discharge Even if it narrows the gap between the maintenance discharge-electrode pairs which adjoin for highly-minute-izing, the incorrect electric discharge between contiguity lines does not arise, but it is field electric discharge type A [0028] in which dealing with highly-minute-izing is possible. Moreover, by according to invention according to claim 2, forming a cathode layer pattern and limiting an electric discharge field on the insulator layer which consists of an electric discharge inactive material formed in the dielectric layer top exposed to electric discharge space While the maintenance discharge current per one pulse is decreased, a maintenance electric discharge pulse number is increased, and the contrast improvement is possible, suppressing the power consumption of maintenance electric discharge Even if it narrows the gap between the maintenance discharge-electrode pairs which adjoin for highly-minute-izing, the incorrect electric discharge between contiguity lines does not arise, but the field electric discharge type AC type plasma display in which dealing with highly-minute-izing is possible can be obtained.

[0029] Moreover, by according to invention according to claim 3, being formed in the above-mentioned dielectric layer top exposed to electric discharge space, forming the insulator layer pattern which consists \*\* of an electric discharge inactive material on a cathode layer, and limiting an electric discharge field While the maintenance discharge current per one pulse is decreased, a maintenance electric discharge pulse number is increased, and the contrast improvement is possible, suppressing the power consumption of maintenance electric discharge Even if it narrows the gap between the maintenance discharge-electrode pairs which adjoin for highly-minute-izing, the incorrect electric discharge between contiguity lines does not arise, but the field electric discharge type AC type plasma display in which dealing with highly-minute-izing is possible can be obtained.

[0030] Moreover, according to invention according to claim 4, in addition to the effect of field electric discharge type AC type plasma display \*\*\*\*\* according to claim 2, the field electric discharge type AC type plasma display which can limit an electric discharge field with a sufficient

precision can be obtained by having formed the cathode layer pattern by the lift-off method.

[0031] Moreover, according to invention according to claim 5, by having formed the insulator layer pattern which consists of an electric discharge inactive material by the lift-off method in addition to the effect of field electric discharge type AC type plasma display \*\*\*\*\* according to claim 3, an electric discharge field can be limited with a sufficient precision, and the field electric discharge type AC type plasma display which has the still advantageous cathode layer orientation in respect of an electric discharge life can be obtained.

[0032] According to invention according to claim 6, moreover, the cathode layer pattern formed in the insulator layer top which consists of an electric discharge inactive material formed in the dielectric layer top exposed to electric discharge space By limiting an electric discharge field to the upper part section of each interior gap of a maintenance discharge-electrode pair as a cathode layer pattern formed in the orientation of a maintenance discharge-electrode pair band-like While the maintenance discharge current per one pulse is decreased, a maintenance electric discharge pulse number is increased, and the contrast improvement is possible, suppressing the power consumption of maintenance electric discharge Even if it narrows the gap between the maintenance discharge-electrode pairs which adjoin for highly-minute-izing, the incorrect electric discharge between contiguity lines does not arise, but the field electric discharge type AC type plasma display in which dealing with highly-minute-izing is possible can be obtained.

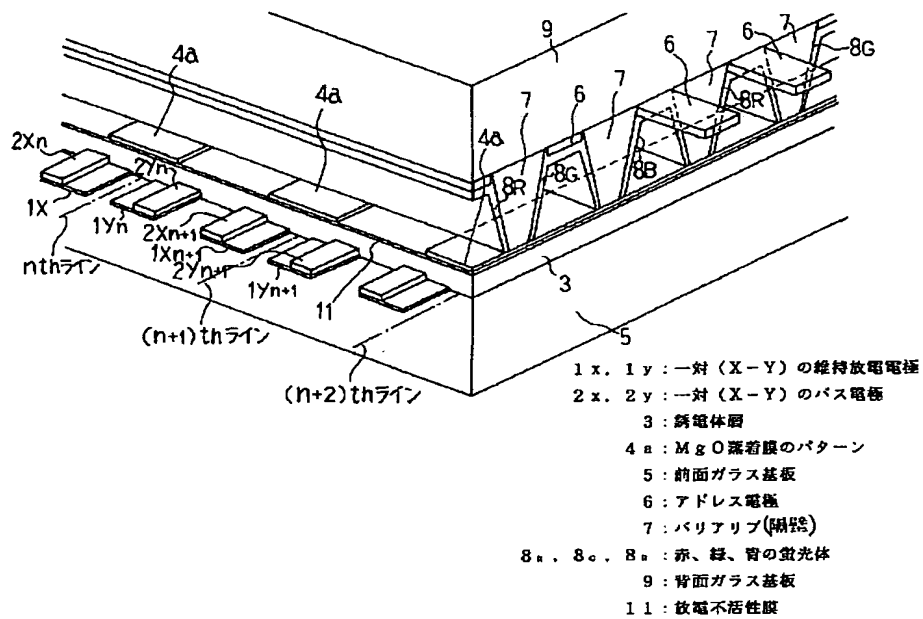
[0033] According to invention according to claim 7, moreover, the cathode layer pattern formed in the insulator layer top which consists of an electric discharge inactive material formed in the dielectric layer top exposed to electric discharge space On the insulator layer top which consists of an electric discharge inactive material between the septa which divide electric discharge space By limiting an electric discharge field as a cathode layer pattern formed in the upper part section of the cathode layer pattern formed in band-like, or each interior gap of a maintenance discharge-electrode pair in the shape of a cell While the maintenance discharge current per one pulse is decreased, a maintenance electric discharge pulse number is increased, and the contrast improvement is possible, suppressing the power consumption of maintenance electric discharge Even if it narrows the gap between the maintenance discharge-electrode pairs which adjoin for highly-minute-izing, the incorrect electric discharge between contiguity lines does not arise, but the field electric discharge type AC type plasma display in which dealing with highly-minute-izing is possible can be obtained.

[0034] According to invention according to claim 8, it is formed in the above-mentioned dielectric layer top exposed to electric discharge space, and moreover, the insulator layer pattern which consists of an electric discharge inactive material formed in a cathode layer top \*\* By limiting an electric discharge field to the upper part section of each gap between contiguity maintenance discharge-electrode pairs as an insulator layer pattern formed in the orientation of a maintenance discharge-electrode pair band-like While the maintenance discharge current per one pulse is decreased, a maintenance electric discharge pulse number is increased, and the contrast improvement is possible, suppressing the power consumption of maintenance electric discharge Even if it narrows the gap between the maintenance discharge-electrode pairs which adjoin for highly-minute-izing, the incorrect electric discharge between contiguity lines does not arise, but the field electric discharge type AC type plasma display in which dealing with highly-minute-izing is possible can be obtained.

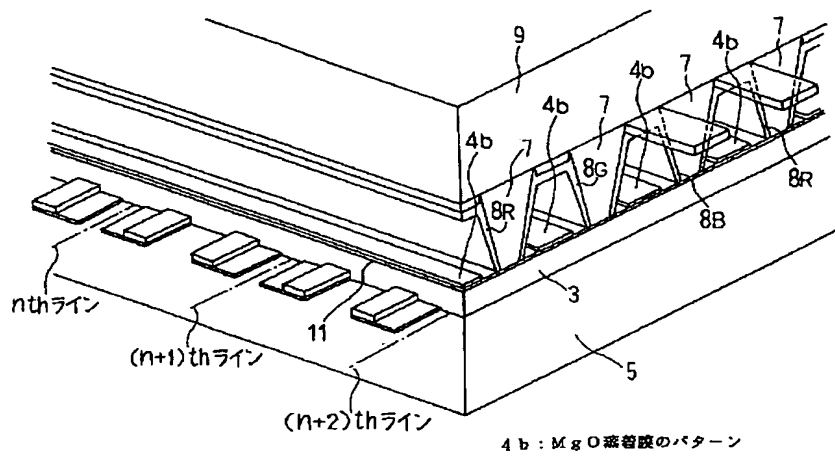
[0035] Moreover, according to invention according to claim 9, it adds to the effect of the claims 1 and 2 or a field electric discharge type AC type plasma display panel given in three. The material which constitutes the insulator layer which the material which constitutes a cathode layer becomes from MgO and an electric discharge inactive material is aluminum<sub>2</sub> O<sub>3</sub> or TiO<sub>2</sub>. By carrying out The field electric discharge type AC type plasma display which acquires the adhesion force with the insulator layer which consists of a cathode layer which is needed on a manufacture process, and an inactive material can be obtained.

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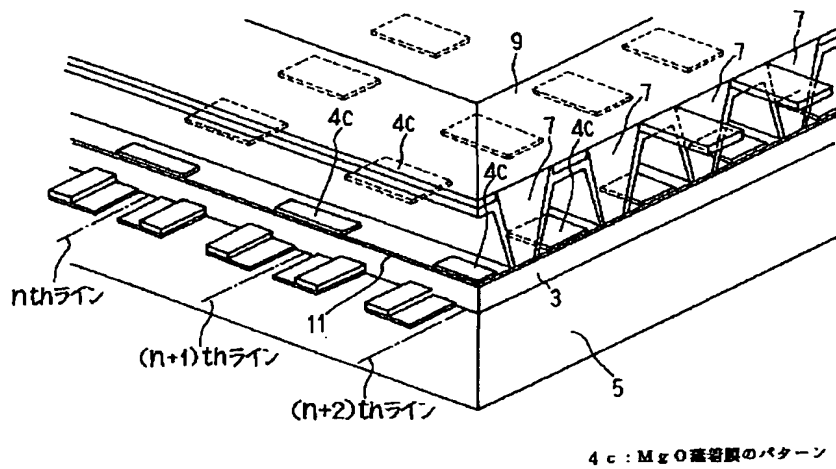
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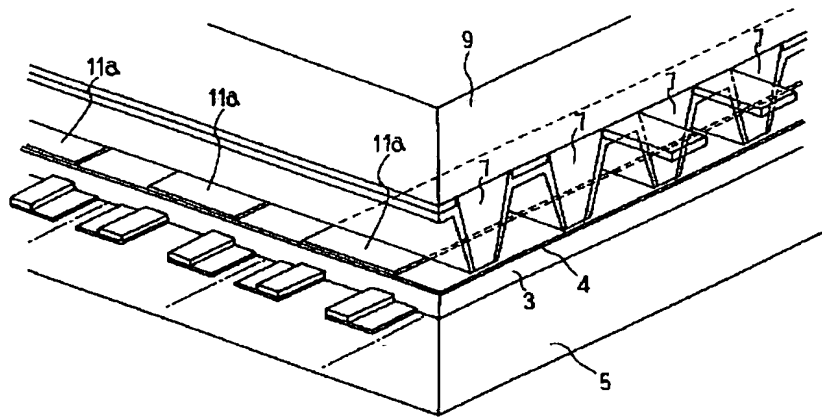
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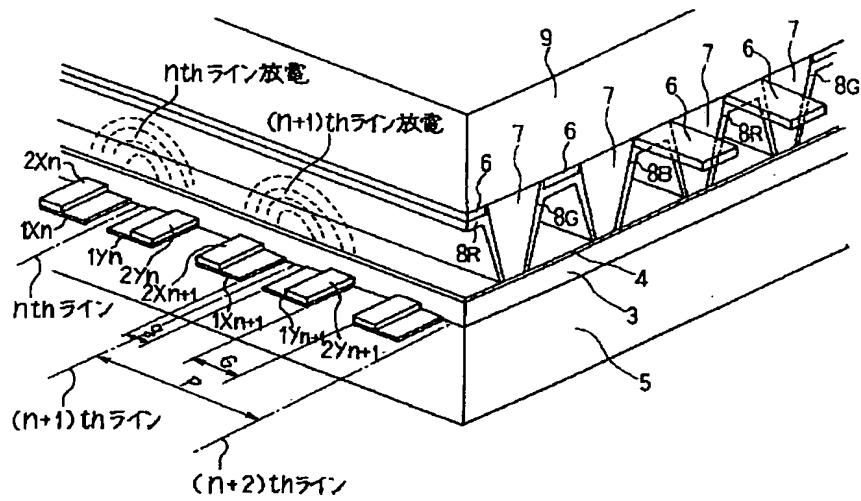
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11a : 放電不活性膜のパターン

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Drawing selection Drawing 5

[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
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3. In the drawings, any words are not translated.

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## CLAIMS

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### [Claim(s)]

[Claim 1] Two or more pairs of electric discharge maintenance electrode pairs by which contiguity arrangement is carried out in parallel on the internal surface of parietal bone of one front-windshield substrate of the glass substrate of a couple, The dielectric layer which covers the above-mentioned electrode pair, and the cathode layer formed in the above-mentioned dielectric layer top, The septum which divides electric discharge space in the above-mentioned electrode pair and the rectangular orientation on the internal surface of parietal bone of the tooth-back glass substrate of another side, In the field electric discharge type AC type plasma display panel which has an address electrode for being arranged between each above-mentioned septum and making a unit photogenesis field emit light alternatively, respectively The field electric discharge type AC type plasma display panel characterized by replacing a part of cathode layer formed in the above-mentioned dielectric layer top exposed to the above-mentioned electric discharge space by the insulator layer which consists of an electric discharge inactive material.

[Claim 2] Two or more pairs of electric discharge maintenance electrode pairs by which contiguity arrangement is carried out in parallel on the internal surface of parietal bone of one front-windshield substrate of the glass substrate of a couple, The dielectric layer which covers the above-mentioned electrode pair, and the insulator layer which consists the above-mentioned dielectric layer top of a wrap electric discharge inactive material uniformly, The cathode layer pattern formed in the above-mentioned insulator layer top, and the septum which divides electric discharge space in the above-mentioned electrode pair and the rectangular orientation on the internal surface of parietal bone of the tooth-back glass substrate of another side, The address electrode for being arranged between each above-mentioned septum and making a unit photogenesis field emit light alternatively, respectively, It is the field electric discharge type AC type plasma display panel which has the fluorescent substance of the predetermined luminescent color in the above-mentioned electric discharge space internal surface. The field electric discharge type AC type plasma display panel characterized by forming a cathode layer pattern and limiting an electric discharge field on the insulator layer which consists of an electric discharge inactive material formed in the above-mentioned dielectric layer top exposed to the above-mentioned electric discharge space.

[Claim 3] Two or more pairs of electric discharge maintenance electrode pairs by which contiguity arrangement is carried out in parallel on the internal surface of parietal bone of one front-windshield substrate of the glass substrate of a couple, Uniformly the dielectric layer which covers the above-mentioned electrode pair, and the above-mentioned dielectric layer top A wrap cathode layer, The insulator layer pattern which consists of an electric discharge inactive material formed in the above-mentioned cathode layer top, The septum which divides electric discharge space in the above-mentioned electrode pair and the rectangular orientation on the internal surface of parietal bone of the tooth-back glass substrate of another side, The address electrode for being arranged between each above-mentioned septum and making a unit photogenesis field emit light alternatively, respectively, It is the field electric discharge type AC type plasma display panel which has the fluorescent substance of the predetermined luminescent color in the above-mentioned electric discharge space internal surface. The field electric discharge type AC type plasma display panel characterized by being formed in the above-mentioned dielectric layer top exposed to the above-mentioned electric discharge space, forming the insulator layer pattern which consists \*\* of an electric discharge



inactive material on a cathode layer, and limiting an electric discharge field.

[Claim 4] Field electric discharge type AC type plasma display \*\*\*\*\* according to claim 2 characterized by having the pattern of the cathode layer formed by the lift-off method.

[Claim 5] The field electric discharge type AC type plasma display panel according to claim 3 characterized by having the pattern of an insulator layer which consists of an electric discharge inactive material formed by the lift-off method.

[Claim 6] The cathode layer pattern formed in the insulator layer top which consists of an electric discharge inactive material on the top of a dielectric layer is a field electric discharge type AC type plasma display panel according to claim 2 characterized by being the cathode layer pattern formed in the orientation of a maintenance discharge-electrode pair band-like at the upper part section of each interior gap of a maintenance discharge-electrode pair.

[Claim 7] The cathode layer pattern formed in the insulator layer top which consists of an electric discharge inactive material on the top of a dielectric layer is a field electric discharge type AC type plasma display panel according to claim 2 characterized by being the cathode layer pattern formed in the insulator layer top which consists of an electric discharge inactive material between the septa which divide electric discharge space in the shape of a cell at the upper part section of the cathode layer pattern formed in band-like, or each interior gap of a maintenance discharge-electrode pair.

[Claim 8] The insulator layer pattern which consists of an electric discharge inactive material formed in the cathode layer top on the top of a dielectric layer is a field electric discharge type AC type plasma display panel according to claim 3 characterized by being the insulator layer pattern formed in the orientation of a maintenance discharge-electrode pair band-like at the upper part section of each gap between contiguity maintenance discharge-electrode pairs.

[Claim 9] the material which constitutes the insulator layer which the material which constitutes a cathode layer is MgO and consists of an electric discharge inactive material -- aluminum<sub>2</sub> O<sub>3</sub> or TiO<sub>2</sub> it is -- the claims 1 and 2 characterized by things, or field electric discharge type AC type plasma display panel given in three

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